



Alternate Fuel and Power in the Forward Deployed Environment

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Agenda

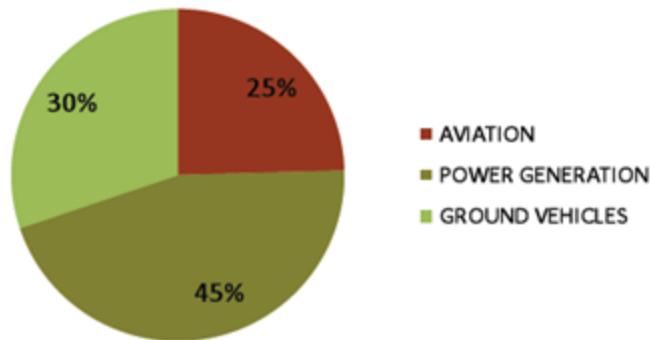


- Why ???
- Some Current Initiatives
 - Solar Power at the FOB
 - Waste to Energy Conversion at the FOB
 - Alternative Fuels in Military Vehicles
 - Improving Fuel Economy
- The Path Forward
- Conclusions



Why Focus on Energy Conservation

It Saves Money



OEF 2010 Strategy Baseline

~1.7M Bbls / Year

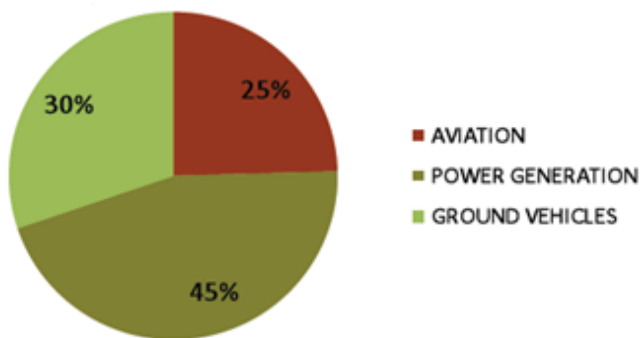
~\$0.5B / Year

(Price/Gal ~\$7.05)



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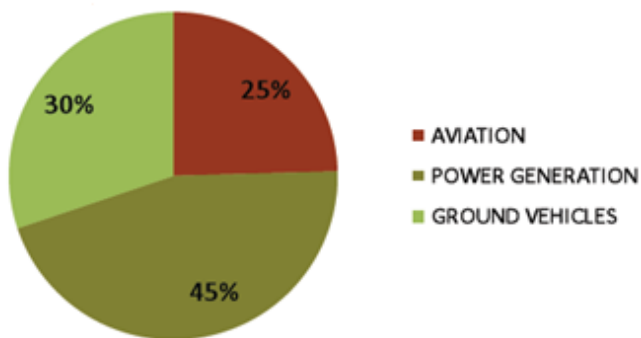


- 299 Fuel/Water Convoys (98 Days)
- 6 Marines WIA hauling Fuel/Water
- 1 Marine WIA per 50 Fuel/Water Convoys



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We Can't Afford to Continue to Do Business as Usual

Current Initiatives



- “Poppies-for-Peace”
- ExFOB
- Individual Initiatives
 - Solar Power at the FOB
 - Waste to Energy Conversion at the FOB
 - Alternative Fuels in Military Vehicles
 - Improving Fuel Economy

Mission

By 2025 we will deploy Marine Expeditionary Forces that can maneuver from the sea and sustain its C4I and life support systems in place; the only liquid fuel needed will be for mobility systems which will be more energy efficient than systems are today.

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Solar Power

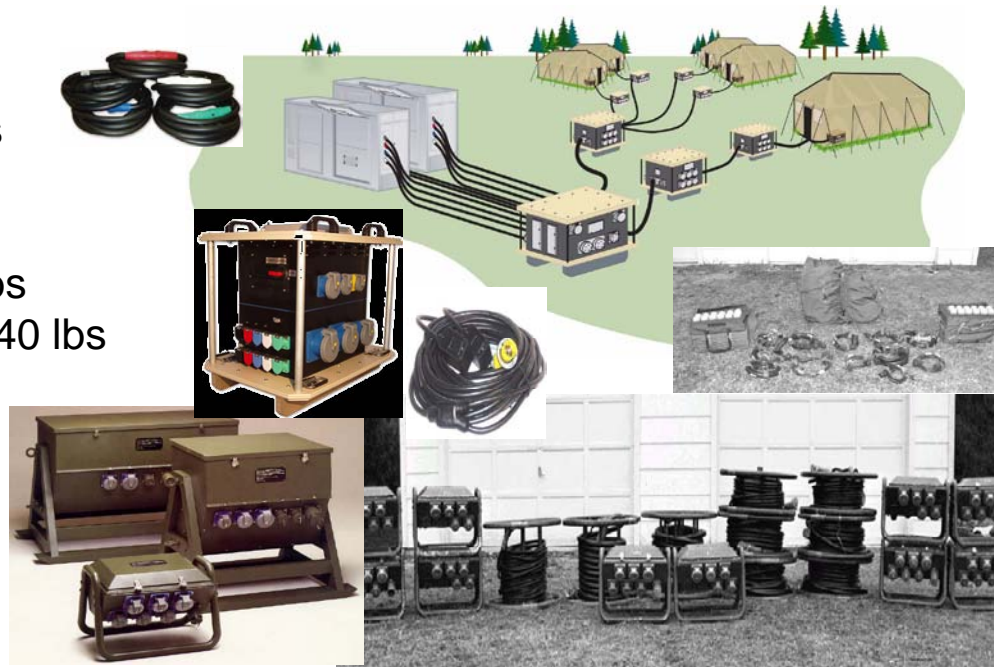


Scenario #1: Current Doctrine for a 500 man FOB:

- Fifty tents required (1 GP tent billets 10 Marines)
- Three 60 watt light bulbs
- Estimated electrical load: 540 watts per tent x 50 tents = 27 Kw
- The following will be required:
 - (1) MEP 805 Generator = 3006 lbs
 - (1) 30 Kw MEPDS-R Panel = 163 lbs
 - (2) 15 Kw MEPDS-R Panel = 81 lbs
 - (6) 5 Kw O.D. Panel = 44 lbs
 - (5) Field Wiring Harness Set = 764 lbs
 - Miscellaneous cables and reels = 1640 lbs

Total embark weight = 9055 lbs

**Fuel for the generator = 5 gal/hr,
or 120 gal/day**



Solar Power



Scenario #2: Solar Powered Lights for 500 man FOB:

- Fifty tents required (1 GP tent billets 10 Marines)
- Four 6.5 watt LED light bulbs
- Estimated electrical load: 26 watts per tent x 50 tents = 1.3 Kw
- The following will be required:
 - Voltage regulator
 - (4) Ultra bright LED lights
 - 12v sealed battery
 - 20w 12v Solar Panel
 - (4) outlets
 - Terminal Block
 - 16/2 AWG wire
 - Support wire
 - Storage box (not shown)
- Weight per light set = 22 lbs.



Total embark weight = 1100 lbs

Fuel for the generator = 0

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Solar-powered Tent Lighting System

- Approximate cost for COTS equipment (not including storage box) = \$357
- Embark weight = 88% lighter than current power generation system
- Can save 120 gal/day of fuel for a 500 person FOB (Net zero fuel use)



Solar Collection



Low voltage LED lighting in a standard GP tent

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UNCLASSIFIED

Waste to Energy Conversion

Where are the feedstocks?



Process Wood Waste



Agricultural Based



Mess Hall Food Waste

Any low-value biomass with a Carbon Footprint will do...



Wood Chips



Landfill Based Waste

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Waste to Energy Conversion



Grind and compact it...



Heat, form and compress it into...

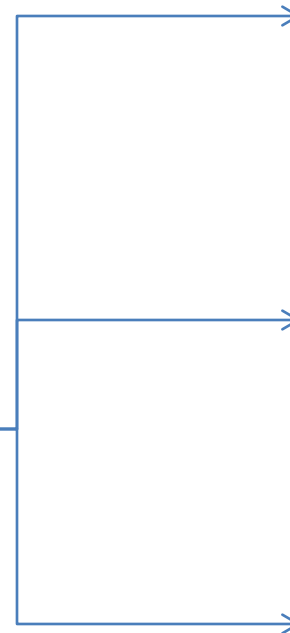


...briquettes, which can be converted (via indirectly-heated pyrolytic gasification*) and harvested as **SYNGAS**



Waste to Energy Conversion

Syngas is a commodity that can be used similarly to natural gas. Gas is captured and routed to electricity producing generators at the FOB



Heat is also a byproduct of the process – can be harvested and used at the FOB



Alternative Fuels in Military Vehicles

- Use of bio-fuels
 - PM LAV tested B20 for one year in AVGP's
 - No significant degradation of performance/properties found during long term storage (over 1 year) in vehicle tank
 - Slightly improved mileage over JP-8 neat
 - Higher ratios and alternate feedstock testing required
- Hybrid technology
- Evolve to certification



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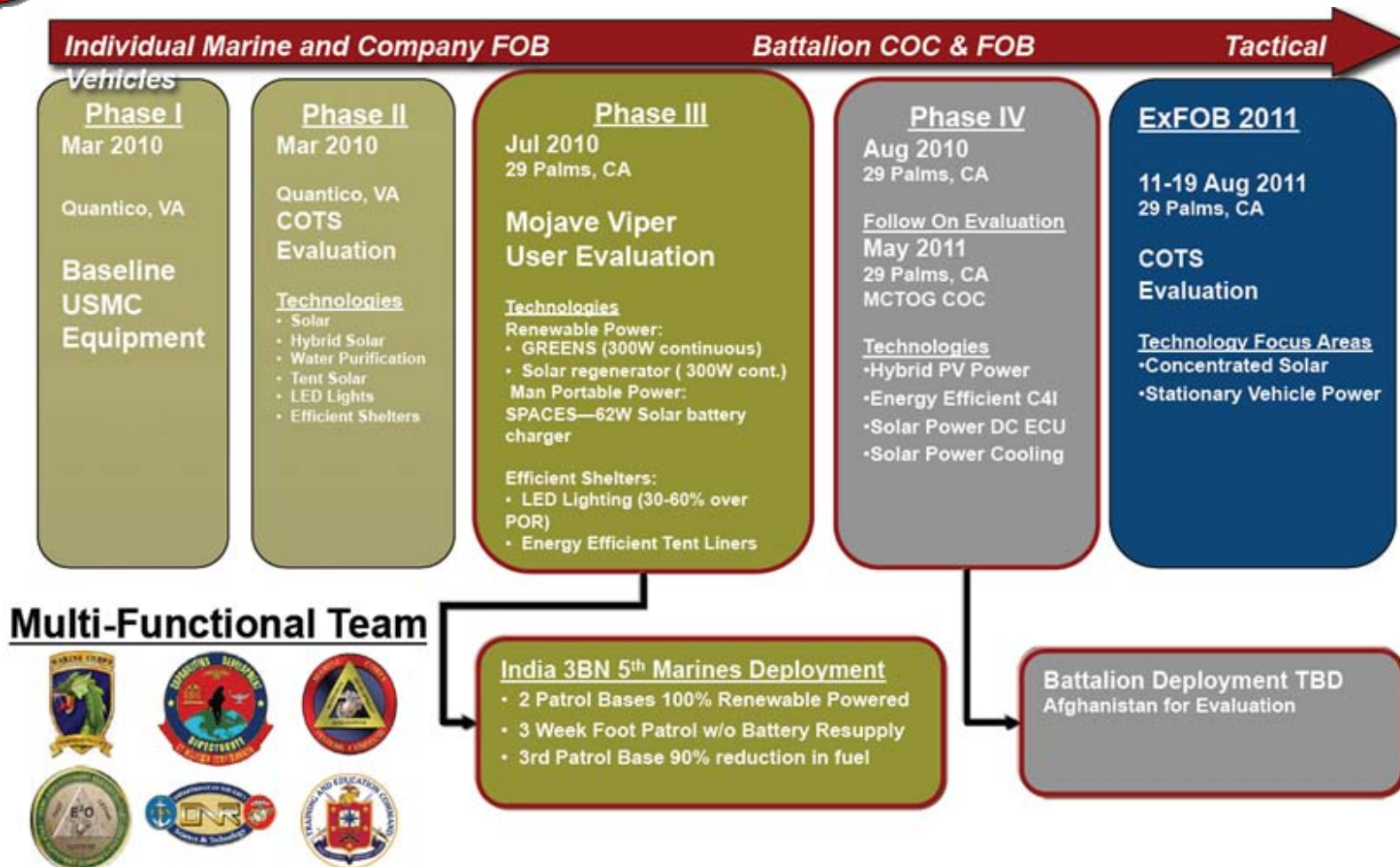
Improved Fuel Economy in USMC Vehicles

- MARCORSYSCOM Platform PM OPT
 - Establish baseline metrics
 - Determine Key Performance Parameters (KPP)
- Fuel Additives
 - Testing additives to improve mileage
 - Business Case Analysis (BCA)
 - Quantitative testing
- Hardware/Software Improvements
 - On-board power
 - Power distribution



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The Path Forward




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Conclusions



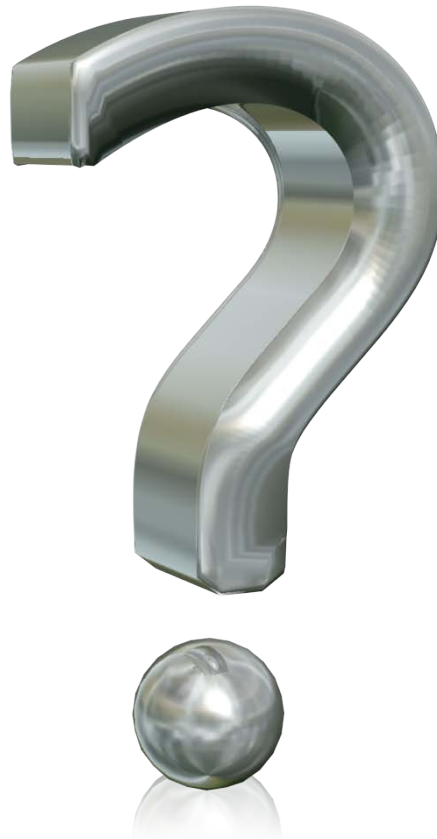
- There are significant gains to be made
 - Reduction and densification of the FOB waste stream
 - Reduction in dependency on traditional fuel
 - Reduction in costs and casualties
- Self-sufficient FOB's are feasible
- There is no single “silver bullet” solution
- Multifunctional teams developing complementary systems can reduce the energy footprint and lighten the MAGTF



The USMC is committed to changing the way we use energy

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Questions



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